

nerdling

APPROVED
BY THE
COMICS
CODE
AUTHORITY

A ZINE OF PHYSICS,
MATHS AND SCI-FI!

ISSUE #8!

introduction

You know that feeling you get when you fall madly in love? Where you're zinging from the moment you wake up, and you feel like you're glowing down to the tip of each hair on your head? It's a sense of excited clarity, like something has put you in touch with the heartbeat of the universe. You become exhilarated, addicted, excited, renewed. You smile more. Sometimes you write crappy poetry. Often you drive your friends nuts talking about it.

The problem is, a lot of adults tend to forget you can feel that way about things other than people. Kids, on the other hand, know it intuitively. They fall in love with dinosaurs and borrow every single library book they can get their hands on. They dream about space and stare at the moon with binoculars and write stories about star-ship chases and ray guns. It's the innocent and imaginative child-like passion captured so perfectly by Bill Watterson in his *Calvin & Hobbes* cartoons.

Still, some adults manage to survive adolescence without killing off their imaginations or the notion of 'love' as anything other than the sappy pop-song stereotype. These adults tend to fall into two equally respectable categories of people in tune with the deeper meaning of things: artists and nerds.

A nerd is someone who derives pleasure from focussing a large amount of intellectual energy into a particular field—that is to say, a nerd is someone who falls madly in love with things. Here in the **nerdling** offices there have been hopeless infatuations with the planet Saturn and the five Platonic solids, on Kurt Elling's scat singing and Les Claypool's bass lixx, on Schrödinger's equation and the poet Sappho, and rumours that there's been an inconsolable crush on a maths lecturer will neither be confirmed nor denied.

So we've packed this issue with stuff for you to fall in love with. **nerdling** correspondent Simon Yates has fallen in love with a topology most strange. Turn to page 20 for his instructions on building one yourself. On page 4 you'll find a four-page dip into the phenomenon that was Science Fiction comics. Writer Ray Bradbury once said of his favourite sci-fi comic, "When Buck Rogers came along, it was the most amazing thing I'd ever seen—I went absolutely crazy. I lived hysterically waiting for that hour when Buck Rogers came into the house." For the modern equivalent, see the Star Trek episode review (and see if you can detect the author's subtle sense of sarcasm), or the section on building a model of the starship *Enterprise* from an old floppy disk.

Then there's astronomy—and who hasn't been awestruck by the heavens at some stage? Well, there's a moon-viewing guide on page 17 that you might find more useful than the standard, boring old astronomy charts. For people who are smitten by numbers, there's an article on the 'golden ratio' phi—some people have become so infatuated by this number that they see it in everything from the pyramids to the meter of a limerick.

So the next time someone tells you to 'get a life' coz they think you're spending too much time reading or building stuff or doing calculations, and not enough time getting pissed or whatever, just listen to the cosmic hum in your ears and feel the buzzing glow in your fingertips that you get from doing what you love, and then smile at them. **nerdling** zine is smiling with you.

the übernerdling
editor, **nerdling** zine
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Japanese scientists develop the technology to turn us all into human batteries. And so on.



CONFICS!

It was with the publication of *Amazing Stories* magazine in 1926 that science fiction emerged as a distinct and recognised form. From that time until the late 1950s, science fiction comics and magazines flooded newsstands and defined the style and visual language of the sci-fi we read and watch today. Well-known authors such as Isaac Asimov and Ray Bradbury owe their careers to sci-fi magazines and comics, just as movies such as *Star Wars* drew many stylistic elements from comics like *Buck Rogers* and *Flash Gordon*.

That's not to say that science fiction comics were a high literary form. Case in point: titles like *The Brain Pirates of Mars* and objects like the *omni-car* and *strato-cruiser*. It was rare to find a female character who wasn't in a bikini and who didn't spend most of her time in bondage. And most of the time, the 'science' involved was dubious at best.

...and that's what makes it so fun. Presented here for your browsing pleasure is an overview of the comics era via a mish-mash of its best, silliest, funniest bits. Enjoy.

"I can read your foul thoughts like a book!"

— *Spacehawk*, the "powerful lone wolf champion of law and order thruout [sic] interplanetary space" of Target Comics, 1940

"Only a norm-plus rating in intelligence quota, energy-efficiency, and mating potential... Who'd be after me?"

— *Marcia Reynolds* in the *Futura* series

"You're Martian scum... we've never had a Martian teacher before and we don't want one now!"

— *Earth students* in *Weird Science-Fantasy* #24

"Hey, you spacelugs! This code message sounds tougher than Plutonian granite!"

— *Astro* in *Tom Corbett*, 1952

"I would like to read more stories of our solar system being attacked by races from other galaxies, because one gets so tired of stories that concern our solar system alone."

— Letter from a reader of *Planet Comics* in 1947

Futuristic devices used by comic-book heroes:

strato-cruiser	para-rays
robo-truck	magno-rays
nullo-bomb	radi-waves
hypno-disk	tracto-rays
video-scope	blasto-ring
detecto-graph	ato-rays
mirro-screen	zeta-beam
syntho-slave	omni-car
ultra-spectrum drive	
sub-sonic neo-crystal hydra-gun	
electro-hypno mentalphone	
escapo-hatch (for defence purposes)	



These serious science fiction stories and comics were actually published:

The Beast-Jewel of Mars (*Planet Stories*, Winter 1939)

The Werewolves from Hydra-Hell (*Planet Comics* #49, 1947)

The Medusa-Men from Mars (*Planet Comics* #41, 1946)

Lars of Mars (1951)

The Brain Pirates of Mars (1940)

The Thing of Venus (*Planet Stories*, Winter 1939)

When Earth Turned into a Comet (*Strange Adventures* #150, 1963)

Planet of the Knob Heads (1940)

Mark Swift and his Time Retarder (*Slam Bang Comics*, March 1939)

Vampires from Dimension X—“The winged monsters poured from a dimension in time like squealing rats hungry for blood!” (*Strange Galaxy*, 1971)

Brain Bats of Venus (*Mr Mystery* #7)

Amazing Adult Fantasy: “The Magazine that Respects Your Intelligence” (1961-1962)

Beware the Human Meteorites (*Space Action*, 1952)

Space Busters vs. Amazons: Charge of the Battle Women (*Space Busters*, 1952)

Mole Women of Jupiter (*Space Detective*, 1951)

Futura: “Yesterday an Earth-bound secretary—tomorrow a warrior queen!” (*Planet Comics*)

Illustration from the cover of *Amazing Adventures* #5, 1951, titled “What was the SECRET of the CRATER-MEN?”



In the 40s and 50s these were some of the sci-fi magazines available in newsstands:

Amazing Stories
Astounding Stories
Astonishing Stories
Comet Stories
Marvel Science Stories
Planet Stories
Strange Stories
Super Science Stories
Startling Stories
Thrilling Wonder Stories
Fantastic Stories
Fantastic Novels
Fantastic Adventures
Famous Fantastic Mysteries
Mysteries of Unexplored Worlds
Mystery in Space
Space Mysteries
Space Action
Space Ace
Space Busters
Space Detective
Space Western
Space Family Robinson
Space Funnies
Space Man
Space Patrol
Space Squadron
Space Thrillers
Space War
Space Adventures
Strange Worlds
Strange Stories
Strange Galaxy
Strange Planets
Strange Tales
Unusual Tales
Uncanny Tales
Tales of Suspense
Tales to Astonish
Tales of Tomorrow
Tales of the Unexpected
Weird Tales of the Future
Weird Science-Fantasy
Weird Science
Weird Fantasy
Weird Worlds



"Tonight there comes to us the first of a series of BUCK ROGERS HOURS—of breathless, dramatic adventures IN THE FUTURE—FIVE HUNDRED YEARS from now—when Science shall have bridged the voids of space between EARTH and her SISTER PLANETS—And EARTHMEN, no longer tied to the surface of their relatively tiny world by the bonds of gravity, shall seek their destiny in the CONQUEST OF AN ENTIRE UNIVERSE!"

—Buck Rogers Radio Broadcast
(November 7, 1932)



"When Buck Rogers came along, it was the most amazing thing I'd ever seen—I went absolutely crazy. I lived hysterically waiting for that hour when Buck Rogers came into the house."

—Ray Bradbury



"I should have guessed earlier the meaning of the 'gifts'! The Earth was born exactly 4 billion years ago *this year*! Our neighbouring planets sent us those objects as—*birthday presents*! Happy Birthday to the Earth! Now—let's go out and welcome the people of other planets as—*friends*!"

—ending to 'Do Not Open Till Doomsday'
Strange Adventures #36, 1953



In October 1954, the comic book industry established the Comics Code in order to stem the "corruption of the comic book as an instructive and wholesome form of entertainment". The new rules included:



- No comics magazine shall use the word horror or terror in its title. [Part B, section 1] Later, the word 'weird' was also outlawed. Comics editor William M. Gaines changed the title of his magazine 'Weird Science-Fantasy' to 'Incredible Science Fiction', but left the genre soon afterwards to create MAD Magazine.
- In every instance good shall triumph over evil and the criminal punished for his misdeeds. [Part A, section 6]
- Scenes dealing with ... walking dead or torture shall not be used. Vampires, ghouls and werewolves shall be permitted to be used when handled in the classic tradition such as Frankenstein, Dracula and other high calibre literary works written by Edgar Allen Poe, Conan Doyle and other respected authors whose works are read in schools throughout the world. [Part B, section 5]

TURNING OFF HIS LASER BLADE, THE LORD OF SITH EXTENDS HIS HAND...



Star Wars borrowed heavily from sci-fi comics. The scrolling title sequence is a direct steal from Flash Gordon, as is the floating cloud city. Galactic empires, intelligent

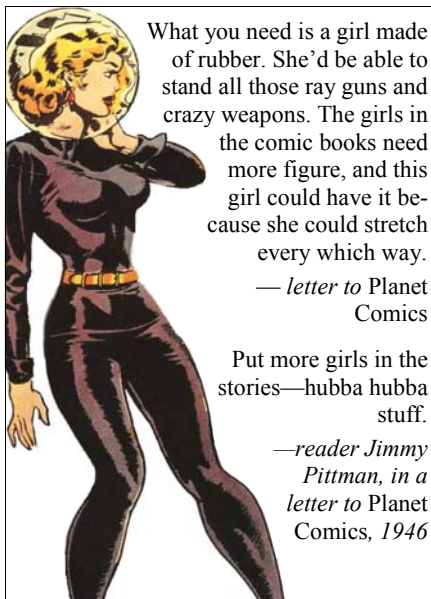
robots, a princess in peril (not to mention bondage and a two-piece), cool spaceships, swashbuckling spacemen and strange aliens were all taken from the sci-fi comics genre.

"Blast her, I will!"

"And once her brain numbed is, us she obey will!"

"Look! She an automaton now becomes!"

— the broken speech of green aliens in The Lost World; strangely reminiscent of a certain green alien in Star Wars...



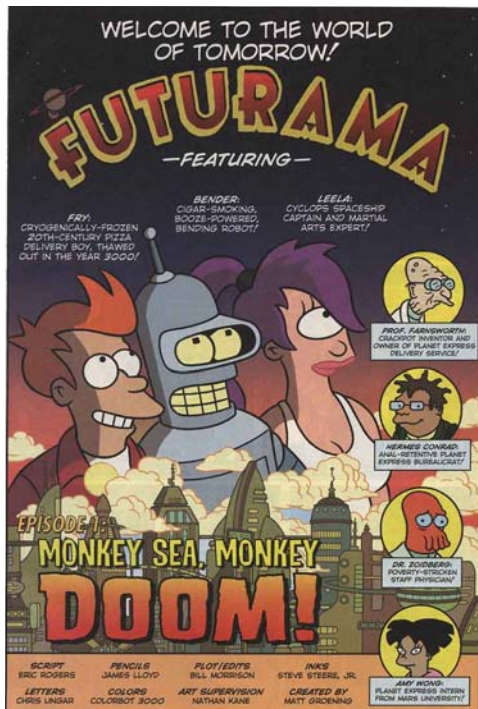
What you need is a girl made of rubber. She'd be able to stand all those ray guns and crazy weapons. The girls in the comic books need more figure, and this girl could have it because she could stretch every which way.

— letter to Planet Comics

Put more girls in the stories—hubba hubba stuff.

—reader Jimmy Pittman, in a letter to Planet Comics, 1946

Modern science fiction continues to be influenced by the sci-fi comics of last century. Compare *Futurama's* Bender to the robot on the cover of *Startling Comics*. For an even greater likeness (same antenna base, same mouth), check out Professor Farnsworth's Bender prototype shown in the *Futurama* episode 'Crimes of the Hot' (episode 1, season 5).



GREAT MOMENTS IN SCI-FI COMICS

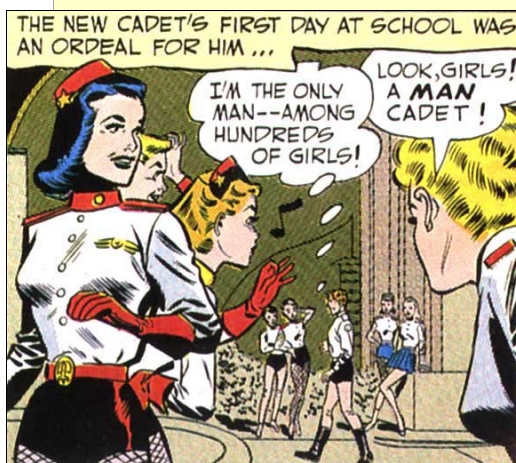
The story "It's a Woman's World!", written by John Broome, was published in 1952 in the DC Comics magazine *Mystery in Space* #8. It sets the scene thus:

In 2980 the first woman was selected president of the Earth federation. By 3100 women had replaced men in key positions in all walks of life. The pilots of Earth's war-rockets which conquered the galaxy in the 33rd century were—women. In sports, women played—while puny men watched and applauded...

The hero of the story, a teenage boy named Greg, vacuums the house while his mother prepares for her job as a rocket pilot. "Why can't I go to rocket cadet school like you did?" he asks her. She replies, "Because you're a man, Greg—that's why!"

However, Greg persists and becomes the first man in recent history to enter cadet school. ("Somehow I feel I must succeed—and prove that a man can do anything a girl can!")

Despite believing that "he'll only be a nuisance in the actual fighting!" a female instructor at the school sends Greg on a training mission. He proves himself by rescuing his commander, Captain Stella, and the couple fall in love and decide to marry.



Greg tells his new bride: "In our house, Stella—vacuuming will be *your* job!" She replies: "Yes dear! Whatever you say!"

"I was the first, Stella," Greg tells his wife, "but now more and more young men are becoming rocket cadets—and leaders everywhere!"

"We women ran things long enough, Greg," Stella sighs, "it's time you men took over again!"

Another classic moment in sci-fi history.

THE

PAGE

OF

LIES

Has the universe gone insane??!! Yes it has.

LIE

1

Proof that $1 = -1$

$$\sqrt{-1} = \sqrt{-1}$$

$$\sqrt{\frac{-1}{-1}} = \sqrt{\frac{-1}{1}}$$

$$\frac{\sqrt{-1}}{\sqrt{-1}} = \frac{\sqrt{-1}}{\sqrt{1}}$$

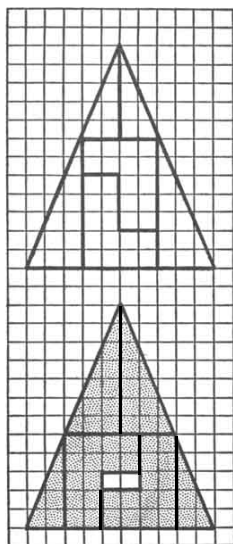
$$\sqrt{1} \times \sqrt{1} = \sqrt{-1} \times \sqrt{-1}$$

$$1 = -1$$

LIE

2

Proof that black is smaller than white
(also known as the 'swimsuit slimming' identity)



Draw on a sheet of paper the 60-square-unit triangle shown at the top of the diagram. Turn the paper over and colour it in black. Cut along the lines to make six pieces. If the pieces are turned over and rearranged to form a black triangle as shown below, you will see that the triangle (which still has the same height and width) now has a hole in it. We have proved geometrically that colouring the pieces black causes Euclidean space to shrink.

Don't believe us? Try it.

ENTERPRISE Episode Reviews



Enterprise is the latest screaming child in the ever-expanding *Star Trek* family. It's set in 2152, about a hundred years before Captain Kirk's time, and still in the infancy of Earth's deep-space-faring years. The series follows the adventures of Captain Archer and his crew aboard the star ship Enterprise.

Star Trek has already done 'swashbuckling' (*The Original Series*), 'diplomatic' (*The Next Generation*), 'strategic' (*Deep Space 9*) and 'woman in charge' (*Voyager*). So what's left over for *Enterprise*? In the words of actor Scott Bakula, who plays Captain Archer, the series is about being "very fallible—I think that makes it really exciting."

Wow, we couldn't have summed it up better ourselves.

Here is the first of our *Enterprise* episode reviews, hopefully to become a regular feature. As Captain Archer would so assertively say, "Let's go!"

Episode 2-12: The Catwalk.

The Enterprise has just been surveying an "uninhabited planet [...] teeming with all sorts of plant and animal life". (How *do* you tell the difference between an alien animal and an alien inhabitant? There's going to be some serious native title issues in this planet's future). Unfortunately their mission is cut short when some friendly aliens warn them that a "neutronic storm" is heading their way—and fast, at about warp factor 7, equivalent to 650 times the speed of light. Those are some pretty zippy neutrons!

After some quick brainstorming with the crew, Captain Archer decides that the safest place to hide from the storm is in a maintenance tunnel inside one of the warp nacelles. ("It's almost like going on a camping trip.") The osmium-alloy lining will shield the crew from the storm's harmful radiation. They agree to harbour the three friendly aliens for the eight-day duration, but it seems that the aliens have something to hide...

What is the aliens' horrible secret? (They are military deserters from a brutal regime.) Is Captain Archer's kind act putting the Enterprise at risk? (Yes, the evil alien warlord, pursuing the deserters and conveniently immune to the radiation, takes over the ship.) Will the crew survive the storm and regain control of their ship? (Yes they will.)

The writing in this episode lives up to the standards we've come to expect from *Enterprise*. The crew's usual blind obsession with rank and their god-worship of the captain are presented through the recurring motif of the captain's chair: "Not much room for a captain's chair," is Ensign Mayweather's first assessment of their makeshift bunker. And later, "Would you like to try out your captain's chair?" pointing to an upturned barrel covered

with (inexplicably) a net.

The writers' oh-so-sharp sense of irony and social commentary is also apparent in Charles 'Trip' Tucker's line, about the three aliens and their religious chants: "Now I understand we're explorers and we're supposed to be open-minded about other cultures, but these guys are driving me crazy!" Yes, this series has more levels than meet the eye. Few of them seem to be intentional.

The attention to scientific detail is worthy of the *Star Trek* franchise—well, mostly. At the very least, it lives up to the 'exciting via fallible' credo. For example, the ship can't outrun the storm—their maximum speed is warp 5 (like, how primitive!). But when we see the advancing storm front, it's a horizontal line—the crew seems to have forgotten that in space it's possible to move *up* and *down*, thereby simply leaping or ducking the front. Hmm. And then there's the moment where Captain Archer gazes out his window at the approaching purple storm and says, "I didn't expect it to be beautiful." That's right—considering it's travelling much faster than the speed of light, he shouldn't have expected to *see* it at all. And then there's the use of 'spatial' as a general prefix to make things sound more futuristic. "Spatial turbulence!" yells one of the crew. "Spatial disturbance!" yells an evil alien. Wow, it's just like being on a Boeing 747. Or in a cool breeze.

There's also the suspenseful scene where the evil alien warlord is sitting in Archer's office, reading his diary. "What about the crew?" his henchman asks. "It appears they have deserted the ship," replies the warlord. Geez, what a good thing that the aliens are devoid of reason and cunning, and didn't think to turn to the last page of his diary. If so, they would have read that the crew were not only still on board, but that they were hiding in the warp nacelle, and could all be fried at the flick of the engine switch! What a narrow escape for the crew of the Enterprise!!

Worthy adversaries are not the only thing lacking in this episode. Characterisation and originality are noticeably absent as well. The writers want us to *like* the captain, and so they serve him up with extra treacle—a pre-storm Henry V motivational speech, sensitive managerial-speak and a few touching moments with his faithful hound. And there's a beautiful moment at the end, too, when T'Pol, the icy Vulcanness, decides to join the crew for movie night—and gains their respect for doing so. Now that she's acting more like them, they won't have to fear her as much for being different!

Enterprise might not be the worst piece of science fiction ever unleashed on the western world (and I'm specifically thinking of *Armageddon* here) but it commits an unforgivable travesty: it lets down those of us who used to love and respect *Star Trek*. *The Catwalk* rates five sugary, treacly, sarcasm-rich gold stars of glory. We can't wait to see what's in store next week.

★★★★★



DIVINE proportion

Phi (ϕ) is an irrational number like π and e , and equals $1.618033988749...$. It turns up in diverse places like nature, art, architecture and maths. Since the time of the ancient Greeks it has been known as the 'Golden Ratio' or the 'Divine Proportion'. However, it has a DARK SECRET: this DIVINE NUMBER is intimately connected to the SIGN OF THE BEAST: 666.

★ Divine Aesthetics

Euclid knew ϕ by a line divided into two, such that the ratio $\frac{\text{large bit}}{\text{short bit}} = \frac{\text{whole line}}{\text{large bit}}$. (*)



There is only one way this can be done, and this ratio $a/b = \phi$. If you let the line length = 1 and rearrange equation *, it is easy to show that $\phi = \frac{1+\sqrt{5}}{2}$



★ Divine Properties

ϕ is surprising in that if you square it you get itself plus one and if you take its inverse you get itself minus one:

$$1/\phi = 0.61803...$$

$$\phi = 1.61803...$$

$$\phi^2 = 2.61803...$$

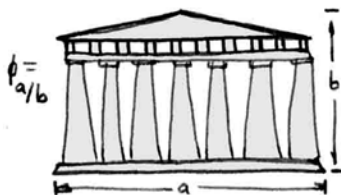
It can also be written as the following expressions:

$$\phi = \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}}$$

and

$$\phi = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}$$

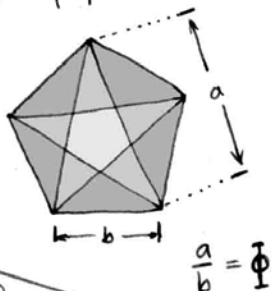
Rectangles with sides in this ratio ('golden rectangles') were considered to be aesthetically pleasing. It is believed the Parthenon in Athens is constructed as such.



OR Sign of the DEVIL?

★ Devilish Associations

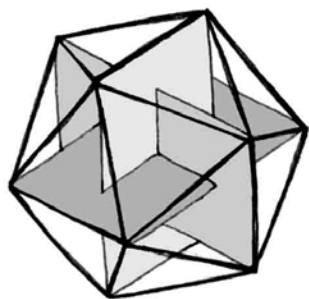
The pentagram, long associated with demonic cults, is constructed from lengths in the ratio of ϕ :



★ Divine Geometries

The icosahedron, one of Plato's 'ideal' solids, is intricately associated with ϕ . The 12 vertices can be divided into 3 groups of 4.

The vertices of any one group lie at the corners of a golden rectangle.



★ The Sign of the Devil

"With a little ingenuity, any one can calculate the number of the beast ... the man's number is 666."
— Revelation 13:18

The number 666 has long been the sign of the devil. But it is also linked to ϕ via the sine of the devil, for
 $\sin(666^\circ) = -\phi/2$.

Also, $\cos(6 \times 6 \times 6^\circ) = -\phi/2$

Thus, $\phi = -[\sin(666^\circ) + \cos(6 \times 6 \times 6^\circ)]$

Proof can be obtained from the triangle below.

★ Divine Nature.

ϕ is present in Fibonacci's sequence, which is formed by adding 2 successive terms to get the next: 1, 1, 2, 3, 5, 8, 13, ...

The ratio of any term to the one before it approaches ϕ as the sequence $\rightarrow \infty$.

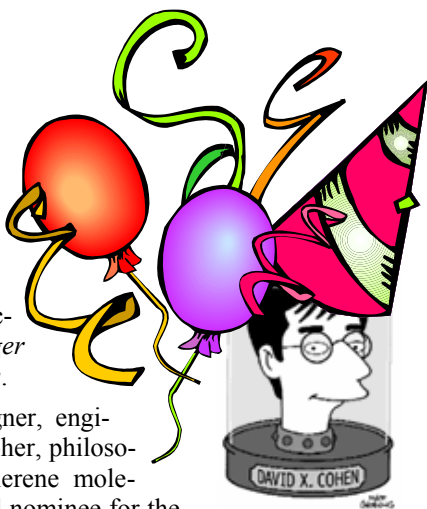
This sequence, and hence ϕ , is present in nature as the spacing of leaves on a plant stem. The fraction of turns around the stem required to advance to the next leaf is always a ratio of consecutive Fibonacci numbers, e.g. $3/8$ (= 3 complete turns around the stem to pass through 8 leaves) or $2/5$, or even fractions like $89/55$ or $144/89$ for pine cone scales or flower petals.



upcoming birthdays: july & august

Celebrate the birthday of your favourite nerd. You know they'd do it for you.

- July 7: **Robert A. Heinlein** (1907): Science fiction great, whose works include *Stranger in a Strange Land* and *Starship Troopers*.
- July 12: **R. Buckminster Fuller** (1895): Designer, engineer, mathematician, architect, cartographer, philosopher, namesake of the buckminsterfullerene molecule, inventor of the geodesic dome, and nominee for the 1969 Nobel Peace Prize.
- July 13: **Patrick Stewart** (1940): Actor whose roles include Captain Jean-Luc Picard (*Star Trek: The Next Generation*) and Professor Xavier (*X-Men*).
- David X. Cohen** (1966): Executive producer and head writer of *Futurama*; has also written episodes for *The Simpsons* and *Beavis and Butthead*. Holds degrees in computer science and physics; worked for a year in the Harvard Robotics Laboratory.
- July 26: **Aldous Huxley** (1894): Author of dystopian novel *Brave New World*.
- Stanley Kubrick** (1928): Director of movies including *2001: A Space Odyssey*, *A Clockwork Orange*, and *Dr. Strangelove*.
- July 30: **Laurence Fishburne** (1961): Actor who portrayed Morpheus in *The Matrix*.
- July 31: **Primo Levi** (1919): Chemist and writer, who was a profound and haunting commentator on the Holocaust. Many of his works, including *The Periodic Table*, draw inspiration from his experiences as a scientist.
- August 5: **Neil Armstrong** (1930): Apollo 11 astronaut and first man to walk on the moon.
- August 6: **Piers Anthony** (1934): Prolific author of science fiction and fantasy.
- Hiroshima Memorial Day**
- August 7: **David Duchovny** (1960): Actor who portrayed Fox Mulder in *The X-Files*.
- August 9: **Gillian Anderson** (1968): Actor who portrayed Dana Scully in *The X-Files*.
- August 14: **Gary Larson** (1950): Creator of *The Far Side* cartoons.
- August 18: **Brian Aldiss** (1925): Science fiction writer and editor.
- August 19: **Gene Roddenberry** (1921): Creator of the series *Star Trek*.
- August 20: **Greg Bear** (1951): Sci-fi author; winner of five Nebula and two Hugo awards.
- August 22: **Ray Bradbury** (1920): Science fiction and fantasy writer, best known for his works *Fahrenheit 451* and *Something Wicked This Way Comes*.
- August 30: **Mary Wollstonecroft Shelley** (1797): Author, most famous for writing *Frankenstein*, which was published when she was 21.



the happy face crater



**Check it out: the Martians are talking to us, and
they're telling us... to have a nice day.**

This photo is of Mars' Galle Crater, which is 230 kilometres in diameter and is shown dusted with early winter carbon-dioxide frost. Galle Crater is located at about the same latitude and longitude on Mars as the Falkland Islands are on Earth. The picture was taken by the Mars Global Surveyor wide-angle camera, which monitors the planet's weather patterns and frost coverage.

image from rednova.com

quotes & extracts

Only two things are infinite, the
universe and human stupidity, and
I'm not sure about the former.
—Albert Einstein

In mathematics you don't understand
things. You just get used to them.
-- Johann von Neumann

"Ah, imaginary numbers again," said the Dean. "That's the
one he says should come between three and four."
"There isn't a number between three and four," said Ridcully.
"He imagines there is," said the Dean.

—Terry Pratchett,
The Science of Discworld

A seven-year-old of my acquaintance
claimed that the last number of all was
23,000. "What about 23,000 and one?" she
was asked. After a pause: "Well, I was close."
—Robert Kaplan, *The Nothing That Is*
- *A Natural History of Zero*

From a list of codes used to designate the cause of an
injury upon admittance to New York state hospitals:

845—accident involving spacecraft
960—fight, brawl, rape.

Source: *Harper's* November 2002 p29

The Mock Turtle went on. 'We had the best of educations ... Reeling
and Writhing, of course, to begin with, and then the different branches
of Arithmetic: Ambition, Distraction, Uglification, and Derision.'

—Lewis Carroll, *Alice's Adventures in Wonderland*

THE NERDLING "RABBIT IN THE MOON" GUIDE TO LUNAR GEOGRAPHY

What do we actually see when we look up at the Moon with the naked eye? [...] We seek a pattern, and we find one. In world myth and folklore, many images are seen: a woman weaving, stands of laurel trees, an elephant jumping off a cliff, a girl with a basket on her back, a rabbit ...

—Carl Sagan in *The Demon-Haunted World*

“What? You mean the moon is sometimes in the sky in *daytime*?” This was a question asked by a fellow uni student during an astronomy course I took a while ago. It made me realise that most of us spend far too little time gazing aimlessly at the heavens nowadays. So, to encourage you a bit more, here’s a really basic guide to the moon’s most visible features. Casually point them out next time you’re outside at night on a date or something. They will be *so* impressed.

The best bit about the moon is, it’s astronomy you can do using just your eyes. If you’ve got a pair of binoculars or even a zoom lens on an SLR camera, they’ll do as basic telescopes.

So what’s with the rabbit stuff? Well, most astronomy texts reference lunar features by latitude and longitude. Where’s the fun in that?—especially if you’re in a different hemisphere to the author and it’s all flipped around. So to cut down on the dry academic waffle that the average guy-lying-on-a-picnic-blanket-on-a-summer-night-watching-the-moon doesn’t need, we’ve referenced all the lunar features with respect to the Rabbit in the Moon. The picture to the lower right (overleaf) will help you locate the rabbit. From then on it should be easier to remember “The ball that’s about to smack the rabbit in the head is called the Sea of Crises,” than “Mare Crisium is located at latitude 38.9°S, longitude 93.0°E.”

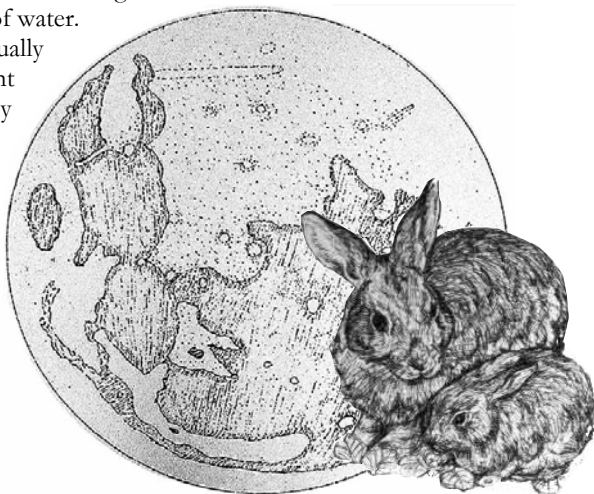
There’s nothing poetic about our rabbit mnemonic, we’ll grant you that. But once you can dispense with it as a crutch, you can appreciate the names of the features for their beauty: the Sea of Tranquility, the Sea of Nectar, the Bay of Rainbows, the Ocean of Storms... Most names were given by early astronomers who thought the dark patches really were great bodies of water.

Now we know that these ‘seas’ are actually big pools of solidified lava from ancient volcanoes. They are properly known by the Latin name ‘maria’, pronounced MAR-ee-uh, or, in the singular form, ‘mare’, pronounced ‘MAR-ay’.

A last note: this is a Southern Hemisphere guide. Northern Hemisphere viewers will have to invert the picture—or discover their own animal-in-the-moon.

e

Turn over for the guide →



TOP HALF OF RIGHT EAR:
SEA OF NECTAR
(MARE NECTARIS)

TOP HALF OF LEFT EAR:
SEA OF FRUITFULNESS
(MARE FECUNDATIS)

BALL NEAR RABBIT'S EARS:
SEA OF CRISES
(MARE CRISIUM)

The crater visible in
the mid-right of this
sea is named Picard.

LOWER HALF OF EARS:
SEA OF TRANQUILLITY
(MARE TRANQUILLITATIS)

RABBIT'S HEAD:
SEA OF SERENITY
(MARE SERENITATIS)

To give you a sense of
scale, the Mare Serenitatis is
about 1140 kilometres
across—a bit wider than New
South Wales.

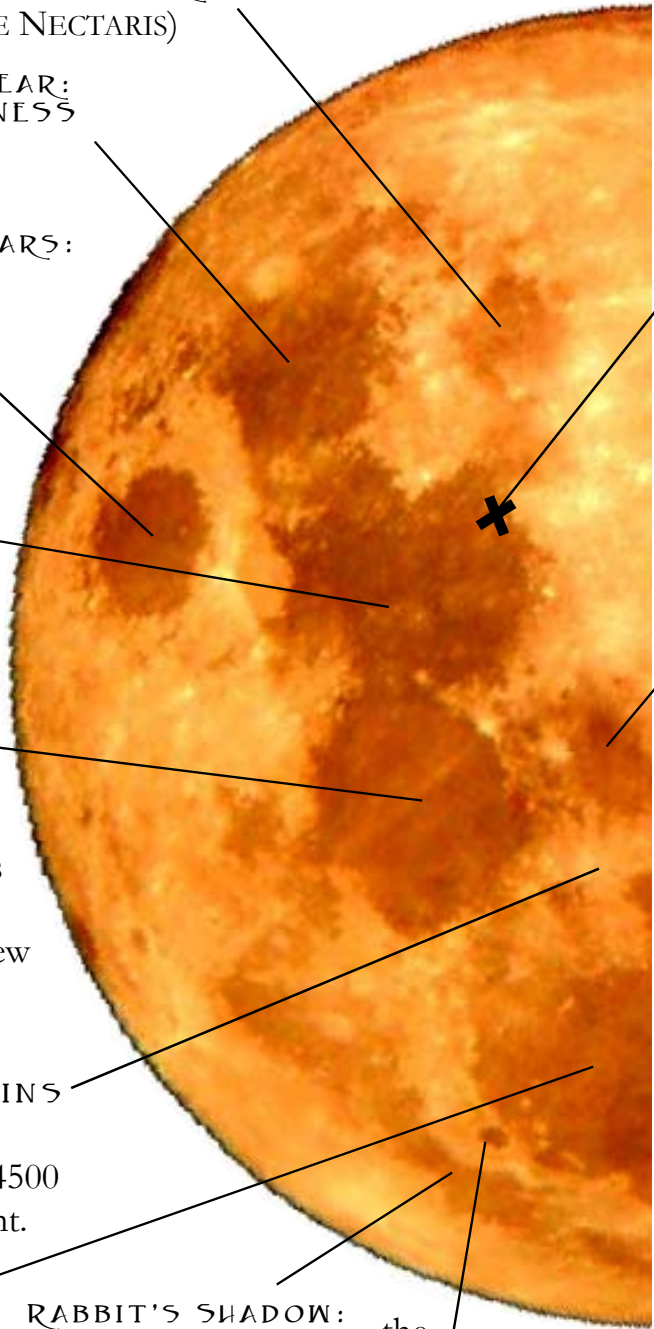
RABBIT'S SHOULDER:
APENNINE MOUNTAINS
(MONTES APPENNINUS)

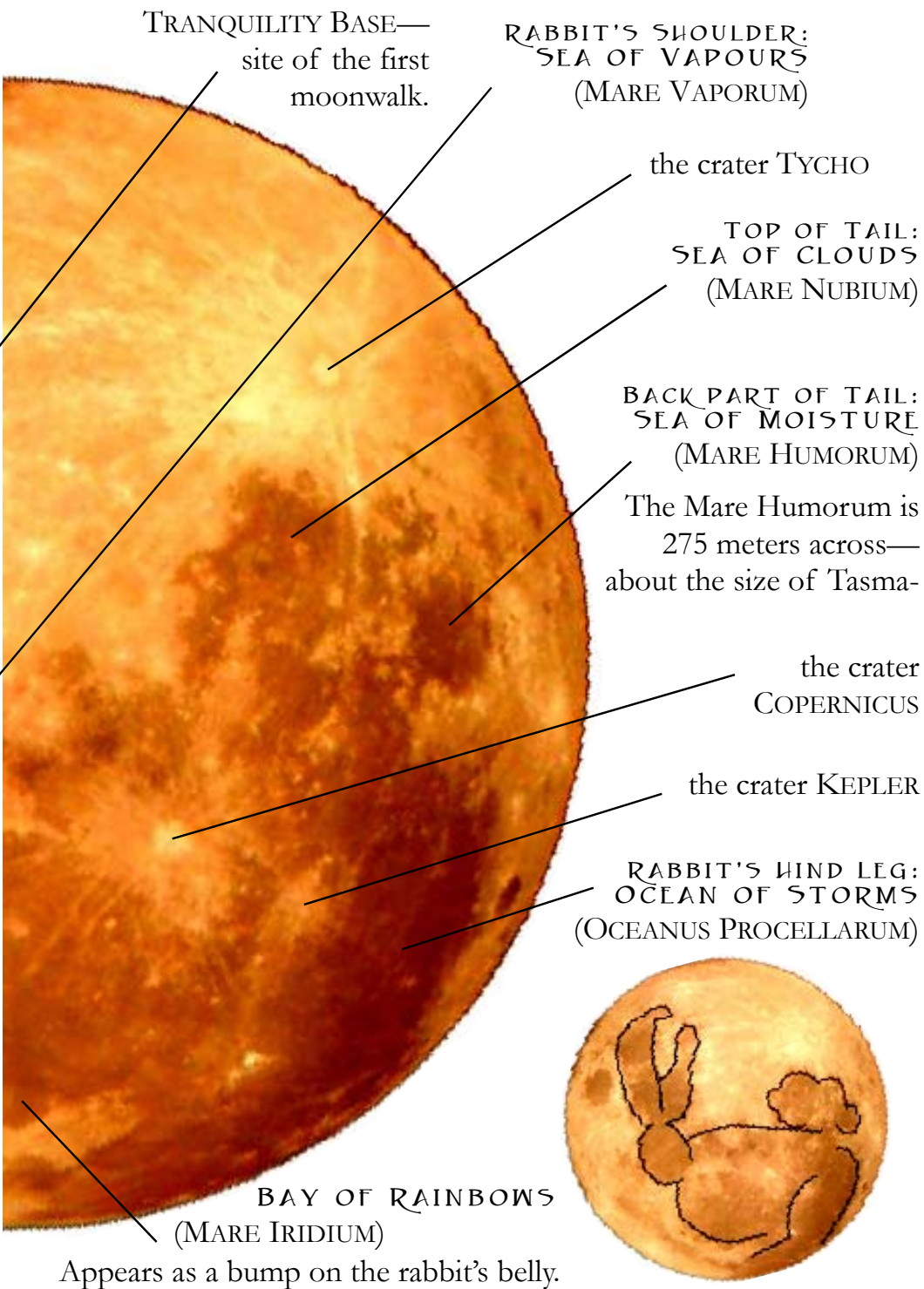
This mountain range is 4500
metres at its highest point.

RABBIT'S BELLY:
SEA OF SHOWERS
(MARE IMBRIUM)

RABBIT'S SHADOW:
SEA OF COLD
(MARE FRIGORIS)

the
crater PLATO





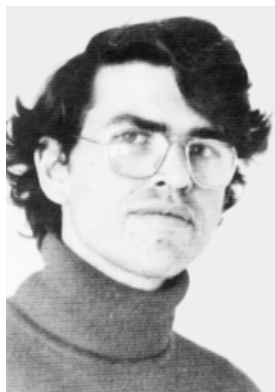
Appears as a bump on the rabbit's belly.

how to sew a three-holed donut

by Simon Yates



In July 1993, I bought a science magazine called *Discover* that had an article called 'Escape from 3-D' in it, which featured mathematicians talking about higher dimensions. The most interesting mathematician was William Thurston, who talked about non-Euclidean geometry. He told a little story in the article about how he taught kids about hyperbolic geometry by giving them a whole lot of cardboard equilateral triangles and getting them to stick them together. After sticking 3 together at each corner you get a tetrahedron, 4 you get an octahedron, 5 you get an icosahedron, 6 you get a flat hexagon. But then he'd get the kids to add another one, and the teachers at the school would start freaking out that he was getting them to do something wrong, but really they were making floppy hyperbolic heptagons. Also in the article was a picture of a weird soft-toy thing stitched out of 24 hyperbolic heptagons by Bill Thurston's



William Thurston
looking groovy.

grandmother. This was the three holed donut, described in the article as a 'convoluted muff' (those things people wear in winter to keep their hands warm).

It was 1998 when I decided that I really wanted my own three holed donut, but by this time I had lost my magazine with the picture in it so I had to go find it again. No libraries had kept back issues of *Discover* magazine, except at the state library where I discovered they keep it on CD, dodgily photocopied. So I printed out a dodgy photocopy that was too blurry to show exactly what the thing looked like. I was at art-school using the internet for the first time, and I typed in 'How to sew a 3-holed cloth torus' and I couldn't believe I found a website with that name. It showed how to sew one big dodecagon-shaped piece of fabric into a 3 holed torus. It had this great home-craft-meets-science feel about it. I sewed a couple of these big pincushiony looking things together, but the problem of making one like in the magazine remained.



the cloth torus made from
a single dodecagon

In desperation I decided I could try and make the 24 heptagon pieces and sew them together like some kind of Thor Heyerdahl 'Kon Tiki Expedition' archaeological experiment. What I ended up with was something that looked like a mutated burger-ring. The last thing I looked up on the internet about it at the time was an article on 'Animal enumeration on regular tilings of the Euclidean and Hyperbolic planes', which showed Poincaré diagrams of the different ways tiles can be edge-connected into a pattern (an animal). This was definitely a clue, because surely the hyperbolic tiles would have to be connected into some organised pattern, but I'd already randomly sewed them together to try to form the 3 holed shape and I felt that would have to do for the time being.



my first attempt: the mutated
nutri-grain, made out of an
old velvet coat

It was only in January that I was looking on the internet again, trying to find out if there was anything new about my 3-holed donut, when I

found exactly what I'd been looking for all along. In my earlier research I had trekked out to the UNSW library to locate a book '3-D Geometry and Topology' by William Thurston, which had a picture of a funny looking sculpture called 'The Eightfold Way', which was written for the sculpture's inauguration in 1998. It included Poincaré diagrams and a strange crossword puzzle-like chart that was like a D.I.Y. recipe for making a 3-holed donut. So it took me about a weekend, staying up late, stitching and unstitching, re-checking my diagrams, almost giving up in frustration at the last minute, that I finally sewed together a real 3 holed donut, or Klein quartic, a legendary mathematical shape with a 336-fold symmetry.



'the Eightfold Way'

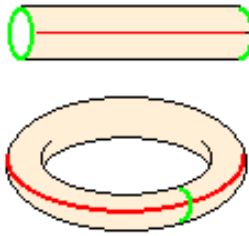
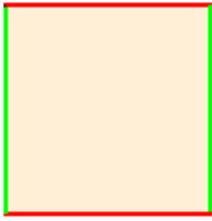
Bill Thurston points out in his introduction that if you put your finger on any edge and follow it to the next intersection, then turn left, then right, and continue going left then right, you will get back to where you started in eight turns. Try this on a tetrahedron, cube, or dodecahedron. Having finished my sewing the surprise result was a kind of twisted up shape that I can keep turning 'inside out' and still leaves me completely baffled. But this isn't the end of the story. A guy I know was telling me about this bookshop near my house I'd never noticed, and I decided to go check it out.

That afternoon the owner of the shop told me his entire life story, how he worked on trains, how he started up his shop, about the exchange system he had invented for customers, his cataloguing system for all the things in his shop. He had collections of magazines immaculately sorted into chronological order, and he had the Discover magazine with the three-holed donut in it. I was in for one last surprise, because this picture showed that it had been sewn out of misshapen, flat heptagons, that looked something like the shape of superman's logo. This would have just been for practical reasons, and I'm sure my donut is sewn in an otherwise identical way.



So what exactly does a 3-holed donut represent? Well, I guess the first ex-

my successful donut, made out of a stolen silver car-cover



the Pac-man universe is really a donut shape. If you go off the top of the screen, you end up at the bottom, and if you go off the left, you end up at the right.

you come back on the opposite side of the screen, so the screen is really describing a donut shape. Imagine that the 3 dimensional universe that we inhabit was like a cube in which when you went out one side you arrived back on the other side. The 3 loops connecting 1. top to bottom 2. left to right and 3. front to back, would form a 3-holed donut. In this kind of space, you could scratch your own back. Astronomers have been scanning the horizons for an identical universe, just in case our universe turns out to be hyperbolic. Well, that's just my understanding of it, I could be wrong.

References:

Introduction to "The Eightfold Way" by William Thurston, in which he discusses the three-holed donut, is in pdf format at <http://www.msri.org/publications/books/Book35/files/thurston.pdf>

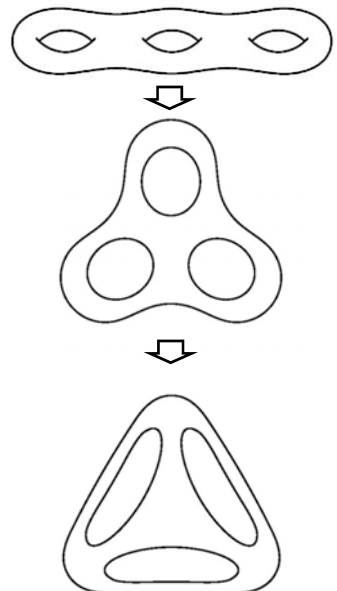
The cloth torus website, with instructions for how to make a torus from a single decagon, is at <http://www.rogmenn.org/math/tori/torus3long.html>

The *Discover* Magazine article is on-line via <http://www.discover.com/archive/index.html>

Simon Yates is an artist and inventor whose works include 3D photocopying techniques, 'looking glass' spectacles and walking robots. See his works at <http://mechanickinetica.tripod.com/>

ample in topology is that a coffee cup can be deformed into a donut. A donut is like a flat piece of paper that's had its top and bottom edges joined together, and its left and right edges joined together. In some computer games like asteroids or Pac-man, when you go off the edge of the screen

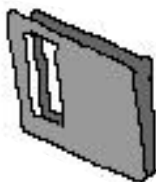
how a three-holed donut is topologically equivalent to a tetrahedron: one can be deformed into the other simply by stretching.



HOW TO MAKE THE ORIGINAL STARSHIP ENTERPRISE OUT OF AN OLD FLOPPY DISK



Take an old 3.5 inch floppy disk and break it apart. It has to be the kind with the gate made of metal, not plastic.



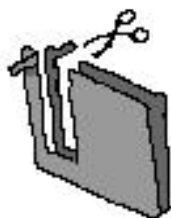
You will need this part...



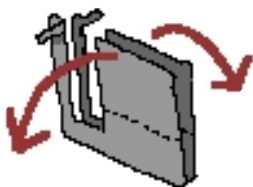
...and this part.



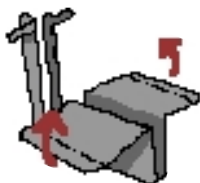
Remove the media.



Snip.



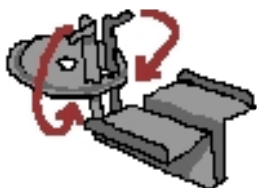
Fold like so...



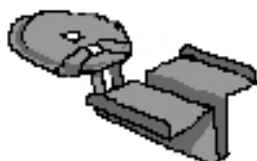
...and so.



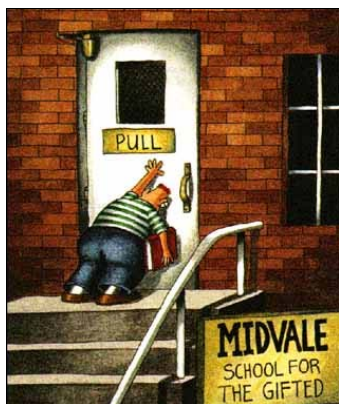
make little snips halfway through the metal to make it easier to get the saucer section on.



To put the saucer on: put the neck up through the hole in the saucer, then put the metal of the saucer through the slits you made. Fold down to secure.



Finished!



The MIDVALE SCHOOL FOR THE GIFTED Hall of Fame

Mark all mathematical heads which be wholly and only bent on these sciences, how solitary they be themselves, how unfit to be with others, how unapt to serve the world. -- Roger Ascham (1515-1568)

"I do not think there is any thrill that can go through the human heart like that felt by the inventor as he sees some creation of the brain unfolding to success... Such emotions make a man forget food, sleep, friends, love, everything." - Nikola Tesla

Niels Bohr was responsible for developing the model of the atom that is taught in schools today, and which led to the development of quantum mechanics.

Nevertheless, he was a slow thinker. He was addicted to American Western movies but often had problems following the plot. Fellow physicist George Gamov complained that during movies, Bohr would have to keep asking him what was going on.

George Gamov himself made great contributions in nuclear physics and the theory of the Big Bang. Despite this, he couldn't spell or do arithmetic.

Thomas Edison was a brilliant inventor who took out more than a thousand patents. However, self-sufficiency was not one of his strong points. Fellow engineer and inventor Nikola Tesla said of Edison, "He [...] lived in utter disregard of the most elementary rules of hygiene. If he had not married later a woman of exceptional intelligence who made it the only object of her life to preserve him, he would have died many years ago from consequences of sheer neglect."

Francis Galton, cousin of Charles Darwin, was a scientist with wide interests. One of his inventions was spectacles that gave divers clear vision under water. He would test out various models while reading underwater in his bathtub. "I amused myself very frequently with this new hobby, and being most interested in the act of reading, constantly forgot that I was nearly suffocating myself, and was recalled to the fact not by any gasping desire for breath, but purely by a sense of illness, that alarmed me. It disappeared immediately after raising the head out of water and inhaling two or three good whiffs of air."

news snippets

After crappy ratings, Star Trek Enterprise decides sexier aliens will save the show

[Toronto Star, July 28] LOS ANGELES—After a season of losing a third of its audience, the Star Trek prequel Enterprise has been called back to spacedock for a refit and retooling.

"The show is going to be more action-oriented, faster paced," says co-producer Brannon Braga. "We're always looking for ideas to ramp up the show."

Another move is to sex up the Vulcan role played by Jolene Blalock, reigning geek heart-throb and popular Maxim pin-up girl.

"T'Pol is getting a little bit of a revamping," she explained. "Another wig ... and some new suits — I actually get to change clothes, because I haven't washed that brown one in the last two years. We've got colour now, and that's always exciting."

Rat brain cells linked to robot arm

[sciencedaily.com, July 9] U.S. and Australian researchers have created what they call a new class of creative beings, "the semi-living artist" — a picture-drawing robot in Perth, Australia

whose movements are controlled by the brain signals of cultured rat cells in Atlanta.

Gripping three coloured markers positioned above a white canvas, the robotic drawing arm operates based on the neural activity of a few thousand rat neurons placed in a special petri dish that keeps the cells alive. The dish, a Multi-Electrode Array (MEA), is instrumented with 60 two-way electrodes for communication between the neurons and external electronics. The neural signals are recorded and sent to a computer that translates neural activity into robotic movement.

The team hopes to bridge the gap between biological and artificial systems to produce a machine capable of matching the intelligence of even the simplest organism. [Source: Georgia Institute Of Technology]

Qapla'! Hospital seeks Klingon speaker

[cnn.com, May 10] PORTLAND, Oregon—Position Available: Interpreter, must be fluent in Klingon.

The language created for the "Star Trek" TV series and movies is one of about 55 needed by the office that treats mental health patients in metropolitan Multnomah County.

"We have to provide information in all the languages our

clients speak," said Jerry Jelu-sich, a procurement specialist for the county Department of Human Services, which serves about 60,000 mental health clients.

Although created for works of fiction, Klingon was designed to have a consistent grammar, syntax and vocabulary.

"There are some cases where we've had mental health patients where this was all they would speak," said the county's purchasing administrator, Franna Hathaway. [AP]

Japanese scientists develop underlying technology for The Matrix

[Sydney Morning Herald, August 4] A device that produces electricity from blood could be used to turn people into "human batteries".

Researchers in Japan are developing a method of drawing power from blood glucose, mimicking the way the body generates energy from food.

Theoretically, it could allow a person to pump out 100 watts — enough to illuminate a light bulb.

The scientists say the "bio-nano" generator could be used to run devices embedded in the body, or sugar-fed robots.





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